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The beating net seemed to contain nothing but ants. It occurred to him to examine the ants a little more closely, and then some of them turned out to be beetles so closely resembling the ants that they had heretofore entirely escaped the notice of collectors. It is an Anthicid, and is still undescribed. Two species of *Temnopsophus* were also found which resemble the same ant in a remarkable manner, and a species of Hemiptera mimics it in a curious way.

Ants' nests are therefore something more than the dwelling places of the ants themselves. They are veritable cities, of which the ants are masters and builders, working not eight but twenty-four hours per day, and with inhabitants of many different kinds with very different modes of life, of feeding and of propagating, and all live apparently in the greatest harmony.

It remains only for me to acknowledge the source of much of my information concerning ants and their guests. Mr. E. A. Schwarz, of the Department of Agriculture, has probably the largest experience of any American collector in searching ant-hills, and his collection of Myrmecophili is probably the finest. He is as liberal with information as he is with specimens, and I take pleasure in admitting that his information and his collection have been freely drawn upon by me.

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GEOGRAPHICAL AND GEOLOGICAL EXPLORATION IN BRAZIL.

BY JOHN C. BRANNER, PH.D.

WHEN the Imperial Geological Survey of Brazil, under the late Professor C. Fred. Hartt, was suspended, geological work in that empire came to a standstill. After the death of Professor Hartt, Professor Derby, the senior assistant on the survey, was, after a good deal of delay, appointed director of the geological section in the National Museum, in charge of which the extensive collections of the survey had already been placed.

Professor Derby has remained in Brazil ever since, and has succeeded in turning to good account much of the material and work of the old survey. The general government, however, has done but little to encourage geological work—nothing, in fact, except to retain Mr. Derby in his place in the museum, and thus to enable him to accomplish something.

But this want of encouragement is not necessarily due to a lack of appreciation of or interest in such work on the part of the prominent statesmen of the country, but rather to the financial condition of the empire, which is somewhat embarrassed by various causes, prominent among which is the gradual disappearance of slaves and consequently of the labor element.

Recently the province of São Paulo has undertaken certain explorations within and along its own borders, which, it is to be hoped, will add much to our geological knowledge of that part of Brazil.

The survey that was inaugurated in that province in May of the present year was projected by the distinguished and able senator from Pernambuco, J. A. Correia de Oliveira, popularly known as João Alfredo, who was president of the province of São Paulo until about the 1st of May.

His original object was a study of the navigability of the Rio Paranapanema, a large stream forming the boundary between the province of Parana and that of São Paulo, and the making of a physical and itinerary map of the province.

The president asked Mr. Derby's coöperation in this work. Mr. Derby, however, told the president that he could only undertake such work in connection with a geological survey. The plan was therefore modified accordingly.

It can best be given in the words of the president of the province in his report to the provincial assembly. As this report shows how far-reaching the influence of our own geological surveys has been, as well as the objects of this survey, I quote it at some length. The president says :

"The plan proposed by Mr. Derby, and which I have the honor to commend to your attention, is essentially the same as that adopted by the late Professor Hartt for the work of the Imperial Geological Survey, and is based upon the methods evolved, after many years' experience, by the geographical and geological surveys of the United States, and which, in view of their rapidity and economy, are the most appropriate for regions in which large and thinly settled areas have to be explored. He contemplates making maps upon a scale of one centimeter to a kilometer, which will show at once the geography, topography, roads, geology and agriculture, and on which will be located cities, factories, surface characters, railways, wagon roads, streams, mines, etc., and the geology, the distribution of land adapted to agriculture and to cattle raising, and that which is unproductive.

"The maps will be accompanied by reports describing the physical features of the province, the geological structure, the agricultural and mineral resources, meteorology, hydrography, including the study of our navigable streams and the means of improving them, the quality of the soils and the natural conditions favorable to industry, etc.

"This plan is perfectly practicable within a reasonable length of time, as experience in the United States has shown, if we count upon the rapidity with which American geographers worked. The *personnel*, if limited to four professionals, will require ten years to complete the map of the whole province, the annual expenses being limited to a score or two of contos.¹

"The estimate for the expenses of the first year, including the purchase of instruments and the beginning of operations, will not exceed fifty contos (\$22,000), and it is to be presumed that it will be advisable to reduce this amount in future years. The results of the labors of the first year will enable the authorities to appreciate the practicability and utility of the plan proposed, and to judge of the convenience of continuing it either under the same organization or upon a more extensive scale.

"It seems most urgent that we should first have information concerning the southern part of the province in order to throw light upon the feasibility of connecting our railway system with the navigable parts of the River Parana and its tributaries by way of the Paranapanema, a connection which was regarded by the Visconde do Rio Branco and by Buarque de Macedo and others as the best road to Matto Grosso. For this reason it seems best that the work should be begun in this region and should include the question of the navigability of the Paranapanema. According to this method the work of subsequent years should be carried on in districts selected with a view to meeting public requirements until, by the coördination of the work of each year the whole province shall have been examined."

The bill appropriating fifty contos (\$22,000) for the work of this survey was passed almost unanimously by the provincial assembly, and Mr. Derby began the work of organization about April 1st.

The corps, with the exception of Mr. Derby himself, is made up entirely of Brazilians. The engineer in charge of the geographical work is Sñr. Theodoro Sampaio, who was at one time an assistant of Col. Milnor Roberts in his explorations of the Rio São Francisco, and of whose ability and fidelity Col. Roberts had a high opinion.

Two young graduates from the Brazilian School of Mines at

¹ A conto of reis, at the prevailing rate of exchange, is \$440.

Ouro Preto have been selected as the geologists, Sñr. Campos and Sñr. Oliveira. Mr. Derby will remain in Rio de Janeiro and direct the work from there.

The survey has been received with enthusiasm in the province of São Paulo, and it is hoped that Mr. Derby may succeed in keeping this enthusiasm alive.

In view of the treatment of Professor Hartt and his works by the Brazilian Government, most scientific men may be somewhat skeptical as to whether the Brazilians have the patience necessary to carry on, even for ten years, a work from which they expect results more striking and more tangible than purely scientific ones. Much however is to be hoped for from the intelligent Paulistas. Theirs is the great coffee region of Brazil, the wealthiest and most enlightened province in the empire. The soil is fertile, the climate is remarkably fine, the people educated and the very types of hospitality. There is every reason then to hope for valuable results from the work begun. It certainly is undertaken in the most promising part of the empire, and is in the hands of the man, who, by more than ten years' residence in that country and by acquaintance with the people and the geology, is best fitted to carry it to a successful issue.

POSTSCRIPT.—Since the above was written the definite instructions, given by the provincial assembly regarding the work of the commission, have been received. The following, quoted from these instructions, will give a further idea of what is to be expected of these explorations:

"Besides the geodetic and geographical work, collections will be made and information obtained, as far as possible, concerning the various branches of natural history, special attention being paid to the practical and economic relations of zoölogy and botany; to industry and agriculture; to animals and plants—both noxious and beneficial; to the conditions of the various branches of industry in the different parts of the province; to the diseases peculiar to cultivated plants and domestic animals, together with the means employed for abating these evils.

"While the commission is not supplied with the requisite *personnel* for services of this character, the chief may obtain the services of specialists either within or without the empire, sending them collections for determination or examination, or for any purpose interesting to science.

"The collection shall be accessible to the public, and shall form the nucleus for a provincial museum."

The field party left Itapetininga, Province of Sao Paulo, on the 25th of May, to begin the explorations of the Rio Paranapanema.